
From microRNAs to targets: pathway discovery in cell fate transitions.

Journal: Curr Opin Genet Dev

Publication Year: 2011

Authors: D Subramanyam, R Blelloch

PubMed link: 21636265

Funding Grants: Mechanisms of small RNA regulation in early embryonic development, MicroRNA Regulation of Human Embryonic Stem Cell Self-Renewal and Differentiation

Public Summary:

MicroRNAs are short RNA molecules that do not encode for proteins but rather regulate the production of proteins from messenger RNAs. Importantly, microRNAs have been implicated in a broad range of stem cell roles in both healthy and diseased tissues. MicroRNAs show great promise as both biomarkers and therapeutics for disease. Here, we review how microRNAs can be used to dissect the molecular basis for cell fate decisions. The implication is that the more we learn about microRNAs and their targets, the more able we will be able to tell a cell what to do.

Scientific Abstract:

MicroRNAs (miRNAs) are 22nt non-coding RNAs that regulate expression of downstream targets by messenger RNA (mRNA) destabilization and translational inhibition. A large number of eukaryotic mRNAs are targeted by miRNAs, with many individual mRNAs being targeted by multiple miRNAs. Further, a single miRNA can target hundreds of mRNAs, making these small RNAs powerful regulators of cell fate decisions. Such regulation by miRNAs has been observed in the maintenance of the embryonic stem cell (ESC) cell cycle and during ESC differentiation. MiRNAs can also promote the dedifferentiation of somatic cells to induced pluripotent stem cells. During this process they target multiple downstream genes, which represent important nodes of key cellular processes. Here, we review these findings and discuss how miRNAs may be used as tools to discover novel pathways that are involved in cell fate transitions using dedifferentiation of somatic cells to induced pluripotent stem cells as a case study.

Source URL: <http://www.cirm.ca.gov/about-cirm/publications/micrnas-targets-pathway-discovery-cell-fate-transitions>